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Proceedings of the regional peer review of the assessment of the northern Gulf of St. Lawrence (3Pn, 4RS) cod

February 23, 2017
Mont-Joli, QC

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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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SUMMARY

This document contains the proceeding from the meeting held within the regional Assessment of the northern Gulf of St. Lawrence (3Pn, 4RS) cod. This review process was held on February 23, 2017 at the Maurice Lamontagne Institute in Mont-Joli. This meeting gathered more than thirty participants from sciences, management and industry. This proceeding contains the essential parts of the presentations and discussions held and relates the recommendations and conclusions that were presented during the review.

SOMMAIRE

Ce document renferme le compte rendu de l'examen régional par des pairs portant sur l'évaluation de la morue du nord du golfe du Saint-Laurent (3Pn, 4RS). Cette revue, qui s'est déroulée le 23 février 2017 à l'Institut Maurice-Lamontagne à Mont-Joli, a réuni plus d'une trentaine de participants des sciences, de la gestion et de l'industrie. Ce compte rendu contient l'essentiel des présentations et des discussions qui ont eu lieu pendant la réunion et fait état des recommandations et conclusions émises au moment de la revue.

INTRODUCTION

The Quebec Region of Fisheries and Oceans Canada (DFO) is responsible for assessing several stocks of fish and invertebrate species harvested in the Estuary and Gulf of St. Lawrence. Most of these stocks are periodically assessed as part of a regional advisory process conducted at the Maurice Lamontagne Institute in Mont-Joli. This document consists of the proceedings of the meeting held on February 23, 2017, on the assessment of the cod stocks in the northern Gulf of St. Lawrence (3Pn, 4RS).

The objective of the review was to determine whether there were any changes in the resource's status and whether adjustments were required to the management plans based on the chosen conservation approach, the ultimate goal being to provide scientific advice on managing the cod stock in the northern Gulf of St. Lawrence (3Pn, 4RS) for the 2017 and 2018 fishing seasons.

These proceedings report on the main points discussed in the presentations and deliberations stemming from the activities of the stock assessment regional committee. The regional review is a process open to all participants who are able to provide a critical outlook on the status of the assessed resources. Accordingly, participants from outside DFO are invited to take part in the committee's activities within the defined terms of reference for this review (Appendices 1 and 2). The proceedings also list the recommendations made by meeting participants.

CONTEXT

Meeting chairperson Martin Castonguay welcomes the participants. After the participants introduce themselves, stock assessment biologist Claude Brassard begins the meeting by highlighting the contribution of his collaborators. He presents the agenda, the terms of reference for the review and the summary of the scientific advice from 2015.

Mr. Brassard briefly discusses oceanographic conditions, the status of neighbouring stocks and the biology, distribution, migration and seasonal condition of the species. In 2015 and 2016, the monthly cod condition indices were generally lower than the averages of their respective series. The observed values are nonetheless considered to be at acceptable levels.

- It is noted that cod reproduce over a long period, increasing the probability that the eggs encounter favourable conditions.
- Considering the current status of neighbouring stocks (under moratorium, critical and cautious zones), it is agreed that we must work on the recovery of this resource.
- With regard to the condition index, some participants nevertheless find it reassuring that this index is increasing before winter. However, participants wonder about the reasons for the decline of this index (e.g. decrease in prey such as capelin).
- It is suggested to examine the condition of cod by sub-area, because there could be spatial variability. It is also proposed to examine the condition of cod (e.g. minimum and maximum condition) with the sentinel fisheries program.

Before proceeding with the resource assessment, brief presentations on ecosystem considerations are introduced. The first presentation by Denis Chabot is on the diet of cod based on stomach content analysis. Mr. Chabot's other presentations are on cod's vulnerability to warming and the deterioration of dissolved oxygen conditions in deep water.

- With regard to stomach contents, lower content values have been observed the past two years, possibly related to a decline in certain prey (capelin, shrimp).

- It is noted that if the water warms, cod will need more dissolved oxygen to carry out its activities (e.g. feeding).
- However, it is noted, in the field, that cod seem to avoid hypoxic areas. Cod may be less affected by climate change, though it remains difficult for the time being to measure the true impact.

ASSESSMENT OF THE RESOURCE

FISHERY

In 2016, the recreational fishery season increased from 32 to 46 days. This fishery's catches are not known, though they have probably increased. An assessment of its catches is necessary.

The TAC for the 2015–2016 and 2016–2017 fishing seasons was 1500 t in accordance with the recovery plan. The preliminary landings totalled 1263 t and 1312 t, respectively.

The three commercial fishery performance indices are increasing and well above their respective averages in 2015 and 2016. Fishers corroborate these trends, according to a survey conducted by the industry.

- Industry members say that it takes more cod in the directed halibut fishery (for longline) than in the directed cod fishery (for longline). The two fisheries are conducted at the same time with two different types of hooks.
- Thus, it is difficult to differentiate with regard to entering data into one type of fishery or another. This situation must be clarified.
- Concern remains with regard to recreational fishing, of which the exact scope is unknown.

ABUNDANCE INDEX

The abundance indices come from four surveys:

1) the DFO survey;
2) the mobile-gear sentinel survey;
3) the longline sentinel survey;
4) the gillnet sentinel survey.

Recently, the standardized catch rates of the longline and gillnet sentinel fishing programs have been increasing. In 2016, they exceeded the averages of their respective series (1995–2014).

The abundance index from the DFO research survey has been increasing slightly since 2010 and has exceeded the series average (1990–2014) since 2014. The abundance index from the sentinel fishery trawl survey varies, without any clear trends, and is at the average level in 2016.

The increase in cod abundance in the northern Gulf of St. Lawrence in recent years is mainly attributable to its increase in division 4S. Since 2013, the spatial distribution of cod has been similar to that observed in the early 1990s.

- Clarifications are made regarding the graph of abundance at age indices from the fixed gear sentinel fisheries program, which may give the impression of a year effect, particularly in 2015. It is mentioned that we should read the data horizontally. The same comment applies to the DFO survey. Thus, it may be a good idea to present these results in a more raw form, while keeping the current graphs.

- It is interesting to note that the two types of fixed gear (longline and gillnet) provide similar results.
- With regard to the coherence at age for the DFO survey, it was previously concluded that the lack of coherence for certain ages (e.g. 6 to 8 years) was not very serious.

SEQUENTIAL POPULATION ANALYSIS

Natural mortality estimated by sequential population analysis (SPA) has remained high in recent years. Possible causes are predation by seals and unaccounted fishing mortality. The estimated exploitation rates from the SPA and tagging program are weak and have been below 0.1 since 2012. Recruitment at age three, as estimated by the SPA, has been increasing since 2003. The abundant cohorts of 2011, 2012 and to a lesser extent 2013 have been confirmed by several indicators. The spawning potential of these cohorts will reach its peak between 2017 and 2020. Although the spawning stock abundance has increased, it is in the critical zone, at 32% of the limit reference point based on the 2017 estimate.

- A few clarifications are made about methodology.
- Despite slight retrospective patterns in the spawning stock biomass (SSB), it is considered that the VPA remains valid because, regardless of the model, it is clear that the stock is still in the critical zone.
- In general, if environmental conditions are conducive to successful reproduction, it is agreed that the 2011 to 2013 cohorts should allow for some stock growth.

CONSERVATION PLAN AND RECOVERY STRATEGY

A recovery plan stipulating the harvest control rules in the event of an increase or decrease in mature biomass was developed by management, Science and industry. The plan adopted in 2013 is briefly presented. The SSB trend was reviewed based on three harvest control rule scenarios; for low, medium and high productivity regimes; and according to specific mortality and reproduction rates.

- It is noted that this plan applies for only five years (2013–2018), so it will need to be reviewed soon.
- Participants say we are seeing this stock beginning to recover. The plan seems to have been successful.

PROJECTION

Projections for 2018 and 2019 indicate that, with an annual harvest of 1,800 t or 3,000 t, the mature biomass should increase by 20% and 17%, respectively.

- We note a slight difference in the mature biomass increase (20% and 17%) between the two harvest levels (1,800 t and 3,000 t). Natural mortality may have more impact (including predation, recreational fishing and other unrecorded catches).

CONCLUSION

FUTURE RESEARCH WORK

Several future projects are mentioned. They are:

- Estimating landings from recreational fishing;

- Continuing studies on the reproductive potential of cod (FSCP) in 2018;
- Continuing to monitor cod condition (FSCP);
- Continuing the tagging program (FSCP) in 4R;
- Pilot tagging project in 4S and measuring survival rates;
- Genomic project (population structure) 3Pn, 4RS vs. 4T, 2J3KL and 3Ps;
- Acoustic tagging in the Strait of Belle Isle;
- Developing new stock status indices, such as area of occurrence and area of occupancy;
- Examining the VPA with the plus age group and natural mortality by age group;
- Population simulation study, ΔM and ΔF;
- Project on cod productivity vs. the climate;
- Reviewing the assessment approach: VPA vs. ACS;
- Developing new terms of reference;
- Developing a new recovery plan;

If the assessment approach is reviewed, it must be kept in mind that any new approach must be subject to peer review (review of the assessment framework).

INTERIM YEAR

The participants agree to provide advice for two years (scientific advice for the 2017 and 2018 fishing seasons). The next stock assessment is scheduled for winter 2019. For the interim year, the response from Science will be based on landings and abundance indices from the DFO survey and sentinel fisheries.

It is understood that we will not conduct a review in 2018. However, it is suggested to think about a rule that could be integrated into the next recovery plan for interim years where a decline is observed.

HIGHLIGHTS AND RECOMMENDATIONS

The highlights are presented and the participants briefly comment on them. Some facts were restructured, others were simplified. Comments having to do with stylistic rewording are not reported.

- It is to be noted that the landings figures for 2015–2016 and 2016–2017 are preliminary.
- With regard to recreational fishing, the participants agree that catches have increased, that they are unknown at this time, but that they must be estimated.
- As for the recommendation, they agree that it is necessary to maintain a low mortality rate for the fishery.

Ultimately, the **recommendation** is as follows:

Although the spawning stock abundance has increased, it is in the critical zone, at 32% of the limit reference point based on the 2017 estimate. It would be sensible for the fishery to maintain a low mortality rate.

APPENDIX 1 – LIST OF PARTICIPANTS

Name	Affiliation
Bernier, Denis	DFO Science
Bourdages, Hugo	DFO Science
Brassard, Claude	DFO Science
Carruthers, Erin	FFAW
Castonguay, Martin	DFO Science
Chabot, Denis	DFO Science
Coffin, David	DFO Fisheries Management
Collier, Frank	RAPBCN
Cyr, Charley	DFO Science
Denis, Marcel	ACPG
Desgagnés, Mathieu	DFO Science
Dubé, Sonia	DFO Science
Dufresne, Yvon	DFO Science
Dwyer, Shelley	Government of Newfoundland and Labrador
Gauthier, Johanne	DFO Science
Gilbert, Michel	DFO Science
Hurtubise, Sylvain	DFO Science
LaCosta, Roger	Industry
Lambert, Yvan	DFO Science
Langelier, Serge (tel)	AMIK
LeBris, Arnaud	Memorial University, Newfoundland and Labrador
Légaré, Benoît	DFO Science
Lussier, Jean-François	DFO Science
Morneau, Renée	DFO Science
Nadeau, Paul	RAPBCN
Nozères, Claude	DFO Science
Ouellette-Plante, Jordan	DFO Science
Robert, Dominique	UQAR
Savenkoff, Claude	DFO Science
Spingle, Jason	FFAW
St-Pierre, Sylvie	DFO Science
Trottier, Steve	DFO Fisheries Management
Van Beveren, Elisabeth	DFO Science

APPENDIX 2 – TERMS OF REFERENCE

Assessment of the northern Gulf of St. Lawrence (3Pn,4RS) cod stock

Regional Peer Review – Quebec Region

February 23, 2017
Mont-Joli, QC

Chairperson: Martin Castonguay

Context

Landings for the cod fishery in the northern Gulf of St. Lawrence are primarily from fixed gear (handlines, longlines and gillnets). The resource is managed mainly by annual total allowable catches (TACs) and a series of other management measures.

At the request of the Fisheries Management Branch, resource assessment is done every two years. The purpose of the review is to determine whether changes have occurred in the status of the resource that would justify adjustments to the management plan based on the retained conservation approach.

Objectives

Provide scientific advice on cod stock status in the northern Gulf of St. Lawrence (3Pn, 4RS). This advice shall include:

- A description of the biology of northern Gulf cod and its distribution;
- A summary of oceanographic conditions in the Gulf;
- A description of the cod fishery, including landings, fishing effort, catch per unit effort, biological data, and cod bycatches in other fisheries;
- A review of other potential sources of information concerning fishing activities that are complementary to official statistics;
- Analysis of data from the DFO annual research trawl survey and sentinel fisheries with mobile gears (July) and fixed gears (gillnets and longlines);
- Analysis of biological indicators related to condition, growth and maturity;
- A sequential population analysis (SPA) to derive trends in terms of spawning stock, recruitment and mortality;
- Analysis of trends of a number of indicators relevant to abundance, productivity, and fishing mortality;
- Projections for 2017 and 2018 based on assessment of trends in the abundance indices and other stock indicators compared to baseline conservation thresholds (limit reference point);
- Determination of the process for providing advice during interim years, including a description of the conditions that could justify a complete stock assessment earlier than initially planned;
- Identification and prioritization of research projects to be considered for the future.

Expected Publications

- Science Advisory Report on the northern Gulf of St. Lawrence (3Pn, 4RS) cod stock
- Research document
- Proceedings containing a summary of discussions

Participation

- Fisheries and Oceans Canada (DFO) (Science and Fisheries Management sectors)
- Fishing industry
- Province
- Aboriginal communities/organizations
- External experts